

Title: Half Baked!

Brief Overview:

This unit focuses on the real-life application of fractions, decimals, and percents by having students explore nutrition through a Healthy Bake Sale. The unit also may be used as a performance task to assess the students' understanding of these skills.

Links to NCTM Standards:

- **Mathematics as Problem Solving**

Students will use prior knowledge of basic mathematical operations to analyze and solve problems encountered in preparation for the Healthy Bake Sale. Students will strategically select appropriate foods for the Healthy Bake Sale and determine amounts based on a specific amount of people using given recipes.

- **Mathematics as Communication**

Students will vote for a fundraising activity, draw graphs to communicate results, and orally explain their reasoning. Students will make charts to advertise the Healthy Bake Sale and write a follow-up letter to the PTA. Throughout the assessment, students will write in math journals.

- **Mathematics as Reasoning**

Students will use logical reasoning skills to evaluate data to help them make decisions about the fundraising activities such as which type of fund-raiser seems most sensible and what will be sold at the Healthy Bake Sale.

- **Mathematical Connections**

Students will use fractions, decimals, and percents to organize data to make decisions about the Healthy Bake Sale. Students will translate real-life situations into graphs, tally charts, and writing to grasp a more global understanding. Students will explore the concept of numeration as they move through this situation.

- **Estimation**

Students will estimate the expected number of people attending the Healthy Bake Sale using a variety of strategies. Mental arithmetic will be encouraged as students explore this assessment.

- **Number Sense and Numeration**

Students will use their knowledge of fractions to show relationships to decimals and percentages in order to effectively make decisions for fund-raising events. Students will use and select the appropriate basic mathematical operation to compute given data.

- **Measurement**

Students will measure food amounts to adjust recipes. Students will use concrete experiences to employ fundamental concepts of measurement.

- **Statistics and Probability**

Students will complete tables and construct an appropriate graph to display data. Students will gain an understanding of how probability applies to the decision-making process. Students will draw conclusions from informative prompts, graphs, tally charts, and manipulatives.

- **Fractions and Decimals**

Students will use fractions and decimals to determine voting results, make baked goods, and to increase ingredient amounts in recipes when needed.

- **Patterns and Relationships**

Students will use patterns to complete tables.

Grade/Level:

Grades 3-5.

Duration:

6 class periods, 50 minutes each

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimation
- Fractions
- Decimals
- Percentages
- Place Value
- Addition/Subtraction/Multiplication/Division
- Money

Objectives:

Students will:

- write about fractions in their math journals using their prior knowledge.
- communicate ideas effectively by working in cooperative learning groups.
- compute accurately using manipulatives.
- interpret data by calculating and placing fractions, decimals, and percentages of votes on a chart.
- construct a graph by selecting an appropriate graph to display results.
- share results by explaining data shown on selected graph.
- write to show relationships by writing in their math journals.
- illustrate equivalent fractions using prior knowledge.
- analyze a tally chart to determine results of a survey.
- create a class tally chart by plotting choices of items sold.
- calculate fractions, decimals, and percentages of a tally chart.
- evaluate daily allowances using a food pyramid.
- place foods into food groups using a food pyramid.
- eliminate unhealthy foods using a food pyramid to determine value of food.
- create an advertisement for the Healthy Bake Sale by designing a poster or flyer.
- draw conclusions by estimating data.
- calculate ingredient amounts using multiplication or division.
- estimate using fractional amounts.
- compute profits using given data.
- identify the key elements of a writing prompt using the FATP.
- write a letter to the PTA using the friendly letter format.

Materials/Resources/Printed Materials: (* Optional)

- Fraction Bars (Overhead and Manipulatives)*
- Decimal Squares (Overhead and Manipulatives)*
- Base Ten Blocks (Overhead and Manipulatives)*
- Rainbow Cubes*
- Teacher Resource Sheets
- Student Resource Sheets
- Crayons/ Colored Pencils/ Markers
- Math journals
- Chart paper
- Large Food Pyramid chart
- Rulers to neatly design posters/flyers
- Recipe Ingredients *
- Measuring cups (tsp., tbs., and c.)

Development/Procedures:

Day One:

Motivation:

An alien has just entered the classroom. He has never heard of a “fraction”. Tell him all he needs to know so he will understand as much as you know about the concepts of fractions. Write down the key points that you will be sure to tell the alien. Share your thoughts with the class.

Procedures:

1. Using the motivational activity as a springboard, give the students the following situation. Tell the students that for the next few days they will learn about a group of 100 fifth grade children who want to raise money for their last school dance. Brainstorm how their knowledge of fractions, decimals, and percents might be useful information for this situation. Chart thoughts (later you will want to see how the information was useful by comparing pre-assessment and post-assessment ideas).

The fifth graders at Winchester Elementary School have been studying nutrition as a part of their Health unit. They recently voted on a fundraising activity that would promote healthy habits in their community in order to have enough money for their End of the Year dance. As a class, they voted for one of the following activities:

- *Soup/Salad Bar Day
- *Family Fitness Night
- *Fruit Sale
- *Healthy Bake Sale
- *Aerobic Class

Twenty four fifth grade children voted for the Soup/Salad Bar Day, twelve for the Family Fitness Night, eight for the Fruit Sale, thirty two for the Healthy Bake Sale, and twenty four voted for the Aerobic Class.

2. Have students look at the “Fractions, Decimals, and Percents Chart “ (FDP) to interpret results of the fundraising activities votes. Ask children to tell which activity will be used to raise money for the class.

3. After discussing results, work as a class to model how to complete the “Fractions, Decimals, and Percents Chart” (FDP). If needed, fraction bars or decimal squares may be used to gain a better understanding of the expectations. Have students complete the rest of the chart independently, with or without manipulatives.

4. Have students select and construct an appropriate graph (circle, bar, pictograph, etc.) to display the results of the votes. Ask students to color the fundraising activities with different crayons or colored pencils in order to show a more effective visual representation of the results.

5. With a partner, have students share their graphs and explain why they selected that graph to display their results. Randomly select students to share their graphs with the class.

Reflection: (* May be used as a homework assignment)

Have students answer the following question to give closure to today’s assessment in their math journals. How are decimals and fractions related? Explain.

Day Two:

Motivation:

Have students illustrate three equivalent fractions in their math journal. Then ask students to show their illustrations to members of their cooperative learning group.

Procedures:

1. Review yesterday’s assessment of fractions, decimals, and percents. Randomly select two or three students to read their journal entries explaining how fractions and decimals are related. Prompt the students to tell which fund-raiser received the most votes and how they arrived at that answer.

2. Tell students that since the fifth graders at Winchester Elementary have decided to have a Healthy Bake Sale, they will now need to conduct a survey to determine what items should be sold. Ask the students to brainstorm what items might be included on the survey form.

3. Have students view the results of the Winchester Elementary School survey shown on a tally chart. Ask the students to respond independently to the questions on the “Tally Ho!” worksheet to assess a general understanding of the tally chart.

Reflection:

Survey your class on what items they would like to sell if they had a Healthy Bake Sale and construct a tally chart to display the results of your survey.

Day Three:

Motivation:

Tell students that because we are learning about children who are planning a Healthy Bake Sale, we will be evaluating the Food Pyramid. Have students work in cooperative groups to brainstorm an example of a breakfast, lunch, and dinner. The students will be working together to see if first they can create examples of a typical meal, then evaluate what they have listed. The students will need to evaluate their meals to see if they have met the daily allowances, or if they have exceeded or left out servings of any particular food groups by placing their meals on a food pyramid. Have students explain their findings and observations aloud.

Procedures:

1. Using the knowledge of daily food allowances found on the food pyramid, have students investigate the baked goods that the fifth graders at Winchester Elementary School selected. Make certain that all items sold will be healthy. Have students appropriately place items on the food pyramid according to the food groups. The students will need to eliminate any unhealthy foods found on the survey given yesterday.
2. Have students design a poster or flyer to advertise the upcoming bake sale. Have students orally describe differences between a poster and flyer. Discuss what an attractive poster or flyer might look like. Create a rubric with the class to evaluate the final product. Be sure to tell the students to keep the following criteria in mind when constructing the poster or flyer.
 - * Clear statement of what is being advertised
 - * Date, time, and location of event
 - * Persuasive slogans and illustrations to attract the audience
 - * Neatly written work

Reflection:

In your math journal, list three ways you have used fractions today. Explain the importance of using fractions.

Day Four:

Motivation:

Orally discuss responses to the following question. Why are fractions important in measurement?

Motivate students to think about this question as they bake. (Later, the students will have additional answers to this question. Explore those responses as a class.)

Procedures:

Today's the big day for the fifth graders at Winchester Elementary School!! They have just been informed that if they help with the baking the PTA will contribute 1/4 of the profits made. This appears to be an excellent opportunity, so they decide to bake "Skinny Pie" and "No Sugar Cookies".

1. Lead class discussion by having children estimate the number of people they expect to attend the Healthy Bake Sale. Have students explain their reasoning behind their estimates. Ask students how they arrived at their answers and what information was helpful to assist in drawing a conclusion.

2. Display the two recipes on an overhead projector and hand out recipe worksheets. Using the two recipes (“No Sugar Cookies” and “Skinny Pie”), have students increase the ingredient amounts for 100 people and 200 people.

(Optional: Change the number of people expected to attend to increase difficulty for a more highly -able group.)

3. Have students read to perform the task of making “No Sugar Cookies” and “Skinny Pie” using the two recipes provided. The students should work in groups of three to four to make these baked goods.

Reflection:

Have students write in their math journals the process in which they used to make the baked goods without having the proper measuring cups. Be sure to have students include what basic mathematical operations they used. (This re-explores the question in the today’s motivation.)

Day Five:

Motivation:

Ask students to estimate what fraction of the day they used yesterday to bake all of the baked goods that they needed for the sale. Specifically, ask students to calculate the fraction of the time they used to prepare the batters and what fraction of the time was used actually baking the items.

Procedures:

The Healthy Bake Sale was a complete success. It ended an hour ago and now it is time to compute the profits and calculate how much the PTA will be contributing.

1. Ask students, “What information do you think will be needed to compute the profits?” Have students work in groups to list information that will be needed. Ask a spokesperson from each group to report what their group said.

2. Use the “In the Money Now!!” worksheet to calculate profits.

3. Write a friendly letter to the PTA thanking them for their contribution and help in making the Healthy Bake Sale a success. Be sure to include exact costs of expenses, income, and the profit made. Have students identify the FATP before writing to focus the writing.

Reflection:

Have students discuss with their groups three situations in which an understanding of fractions is valuable. Describe the situations and explain why the understanding of fractions is valuable.

Day Six:

Give students the School Dance Assessment to evaluate new learning. (See handout in back of learning unit.)

Additional writing ideas:

1. Write a poem about fractions.
2. Write the fraction of vowels in your name. Explain how you know.
3. Write the fraction of consonants in your name. Explain how you know.

Performance Assessment:

This is an ongoing assessment of many mathematical skills, specifically fractions, decimals, and percents. This assessment is designed to determine if application of these skills is evident and is used in a real-life situation to enable students to make connections. This assessment uses a variety of approaches to measure learning. First, the graphs, tally charts, and illustrations are constructed responses. Secondly, a products-based assessment is used in the form of a poster and poetry, if so desired. Next, this assessment is process-focused as well. Oral questioning, kid-watching, and math journals are used for this type of assessment. Furthermore, rubrics are included to evaluate students.

Extension/Follow Up:

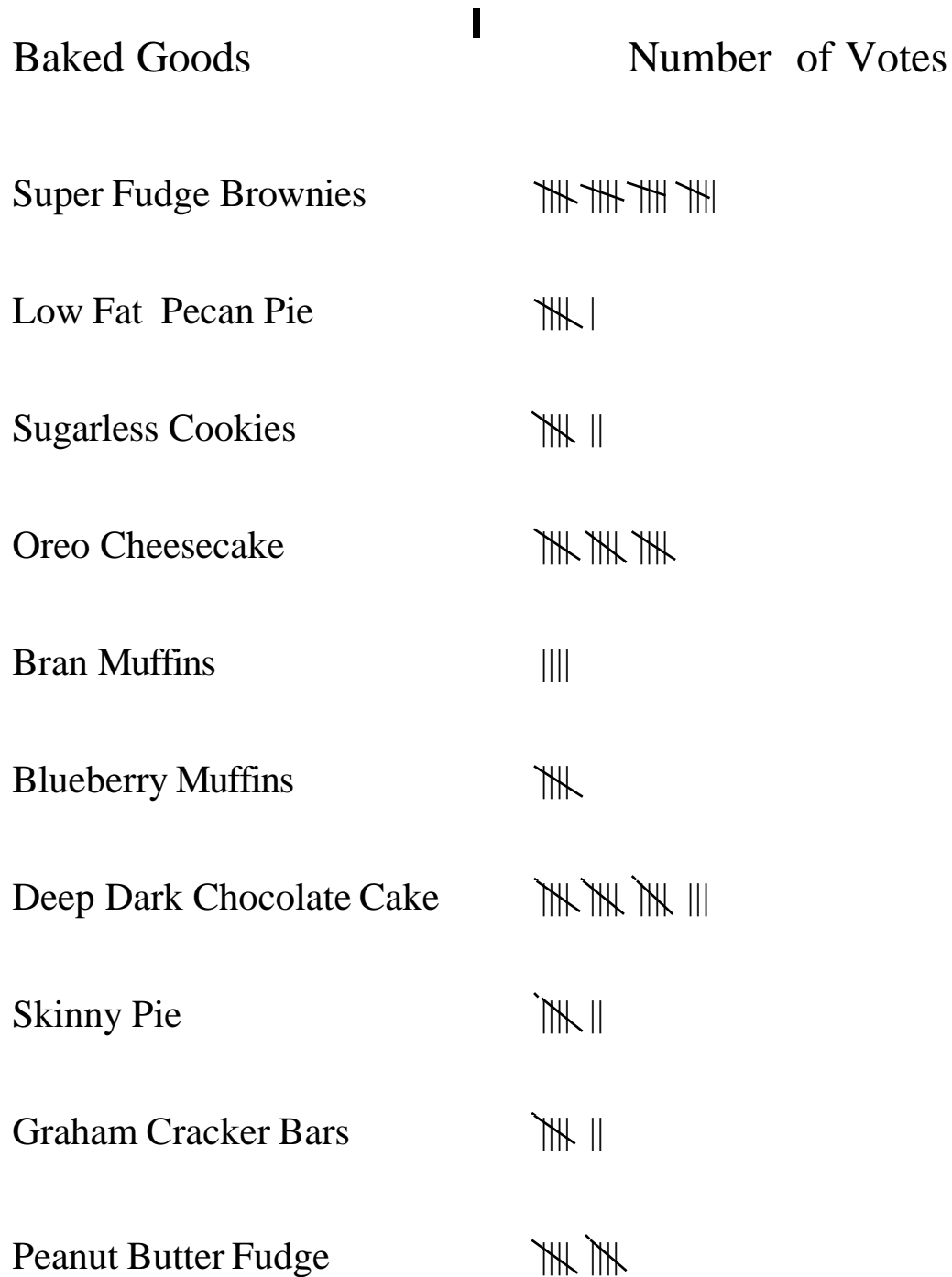
This unit could be used to introduce students to probability or be used as an assessment of skills already taught such as fractions, decimals, percents, and measurement. If needed, after this assessment, lessons may be repeated focusing on the weak areas. Also, a video-taped commercial could be made to advertise the Healthy Bake Sale.

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“Healthy Bake Sale Survey” Tally Chart



FDP Chart



Fundraising Activity	# of votes	Fractions	Decimals	Percentages
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Soup/ Salad Bar Sale				
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Family Fitness Night				
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Fruit Sale				
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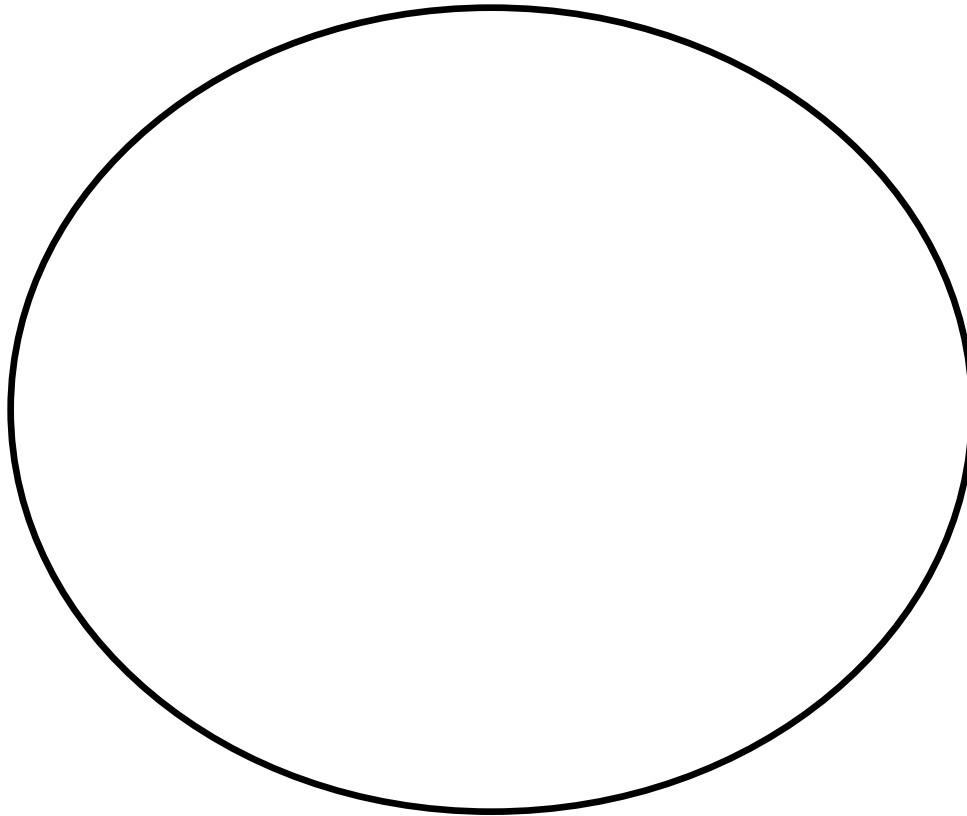
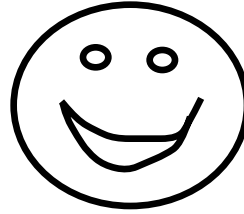
Healthy Bake Sale				
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Aerobic Class				
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My Circle Graph

Name _____
Date _____

- 1) Select **RAINBOW CUBE colors** for each of your responses.
- 2) Select the **amount** of **RAINBOW CUBES** you need
- 3) **Arrange the cubes evenly** around the circle (keep the same colors together)
- 4) **Draw a line** from the center to where the colors change
- 5) **Label each part** of the circle graph with the category and # of data



I notice that _____

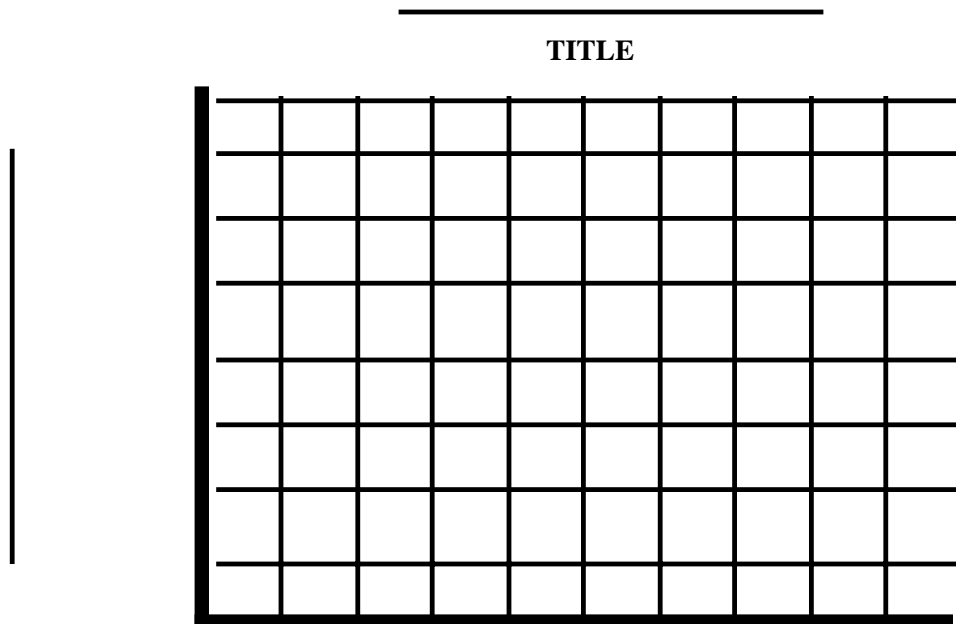
Intimations!

Horizontal Bar Graph

*Use the given data to construct a bar graph.
Be sure your bar graph contains: a title,
appropriate labels and a key if necessary.*

Name _____

Date _____



Three statements I can make about this data are:

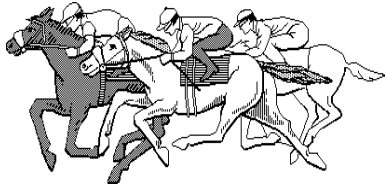
Creating A Pictograph

Name _____

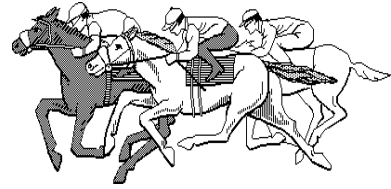
Use the given data to construct a pictograph

TITLE

Three statements I can make about this data are:



Tally Ho !!



1. If each of the fifth grade students voted the same amount of times, how many times did each student vote? Explain your answer.

2. What baked good did most of the students vote for?
Why do you think most students voted for this baked good?

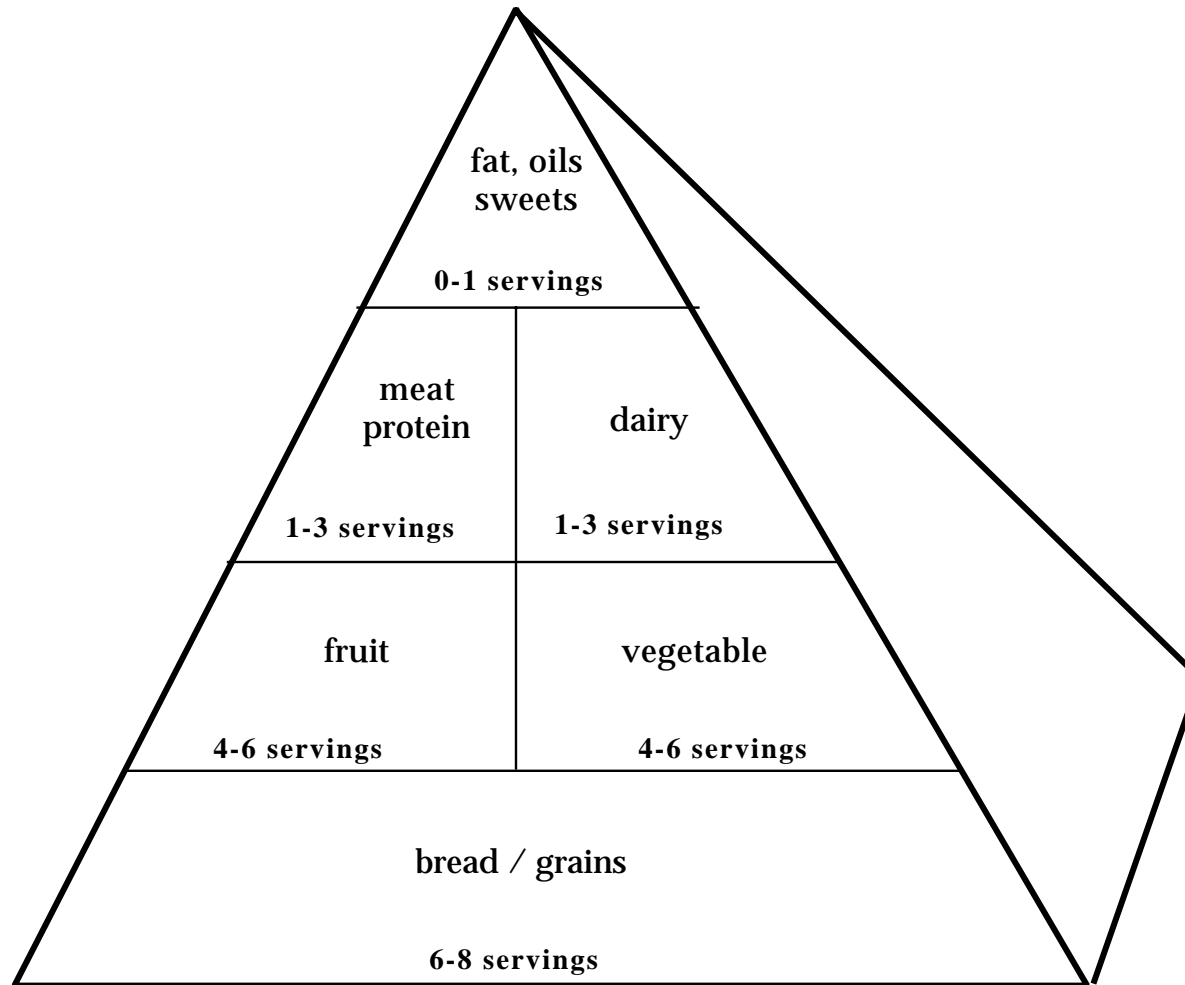
3. What baked good was the least popular?
Why do you think this food is the least popular?

4. Which baked goods would not be fit for the Healthy Bake Sale?
Explain why they would not be.

5. What do you think would be the best goods for the Healthy Bake Sale? Explain your answer.

Food Pyramid

Healthy Eating



“No Sugar Cookies”

2 c. flour
2 tsp. baking powder
1/2 tsp. salt
1/2 tsp. cinnamon
1/2 c. softened margarine
1/2 c. chopped nuts

1/2 c. raisins
1/2 c. orange juice
1 tsp. grated orange peel
1/2 c. shredded coconut
1 egg, beaten

Mix all ingredients together. Drop dough by tablespoon 2 inches apart on greased cookie sheets. Bake 20 minutes until lightly browned in a 375° oven.

adapted from a recipe created by Mary Myers

“Skinny Pie”

2 c. pineapples and juice
1 1/2 c. dry milk
4 pkg. artificial sweetener
2 pkg. unflavored gelatin

3 Tbsp. lemon juice
1 tsp. vanilla
1/2 c. boiling water
8 oz. cottage cheese

Dissolve gelatin in boiling water. Add remaining ingredients except for about 1/2 cup of pineapple to put on top. Sprinkle with cinnamon. Refrigerate until set.

adapted from a recipe created by Betty Stonesifer

“No Sugar Cookies”

Serving of 25

- Serving of 100

- Serving of 200

2 cups of flour

2 tsp. baking powder

1/2 tsp. salt

2/5 tsp. cinnamon

1/2 cup of margarine

1/4 c. chopped nuts

4/8 c. orange juice

1 tsp. grated orange peel

2/4 c. shredded coconut

1 egg, beaten

“Skinny Pie”

Serving of 25

Serving of 100

Serving of 200

2 c. pineapple
juice

1 1/2 c. dry milk

4 pkg. artificial
sweetener

2 pkg. unflavored
gelatin

3 Tbsp. lemon juice

5/10 c. boiling water

8 oz. cottage cheese



The students earned an income of \$390.00. They realize to calculate their profit they must not include the expenses they had to spend out of their class treasury. Their total costs of expenses was \$150.00. Use this information to calculate the profit. Show your work.

Profit _____

I determined this was the profit by _____

The students also remember that the PTA offered to contribute $\frac{1}{4}$ of their profit. What will be the amount of the PTA contribution? Show your work.

Contribution _____

I determined this was the contribution by _____

Writing Prompt

The Healthy Bake Sale was a complete success. The profits were substantial, especially with the help of the PTA. The PTA's contribution of 1/4 of what was made was greatly appreciated. To express your appreciation, you will need to write a friendly letter to the PTA thanking them for their contribution. Be sure to include the total profit amount to inform them of how successful the Healthy Bake Sale was.

Directions: Complete the FATP chart to help focus your writing. Then, write the letter.

F _____

A _____

T _____

P _____

[illegible]

Writing Prompt Rubric for Letter to PTA

Three Points

- Has all parts of a friendly letter.
- Writing is clear, well organized, and stays focused on topic.
- Addresses the audience.
- Includes a complete explanation about the expenses, income, and profit of the Healthy Bake Sale.

Two Points

- Has most parts of a friendly letter.
- Writing is well organized and fairly focused on topic.
- Addresses the audience.
- Includes a somewhat complete explanation about the expenses, income, and profit of the Healthy Bake Sale.

One Point

- Has some of the parts of a friendly letter.
- Writing is somewhat organized and does not stay focused on topic.
- Somewhat addresses the audience.
- Includes a vague explanation about the expenses, income, and profit of the Healthy Bake Sale.

Graph Rubric

Three Points

- Has appropriate title.
- Uses correct scale (equal intervals).
- Labels the vertical (scale) and the horizontal (data) axes (not applicable for the circle graph).
- All the data is correct.

Two Points

- Has most of the above parts of a graph.
- Most of the data is correct.

One Point

- Has some of the parts of a graph.
- Some of the data is correct.

Zero Points

- Graph and data are inaccurate or missing information.

School Dance Assessment

Winchester Elementary School recently had a school dance. The profits from the dance were going to be used to help provide materials for the school. The total profits made were \$2,800.00. Half of this will provide new computers for the school. \$700.00 will be used for purchasing new Social Studies textbooks and the remaining \$700.00 will be used to buy new library books. Compute the amount of money that will be used for purchasing computers. Then calculate the fractional and percentage amounts for each purchase. Graph the results to show how much money will be used for each type of materials.

Part I.

Material Purchased	Amount Used	Fractional Amount	Percentage Amount

Part II.

Show the results in a graph.

Part III.

Explain how you would calculate how much would be spent on each type of materials if the profits totaled \$3,200.00, based on the percentage amounts previously computed. Be sure to explain the process used to determine amounts.